CLAIMS

1. A drug mixing system comprising:

at least one receptacle port adaptor adapted to be inserted into a port of a fluid receptacle;

at least one vial adaptor adapted for connection to a vial containing a drug; and

at least one syringe adaptor adapted to be attached to a syringe and to at least one of said at least one receptacle port adaptor and said at least one vial adaptor,

said system being characterized in that at least one of said at least one receptacle port adaptor, said at least one syringe adaptor and said at least one vial adaptor being vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form.

2. A drug mixing system comprising:

at least one receptacle port adaptor adapted to be inserted into a port of a fluid receptacle;

at least one vial adaptor adapted for connection to a vial containing a drug; and

at least one syringe adaptor adapted to be attached to a syringe and to at least one of said at least one receptacle port adaptor and said at least one vial adaptor,

said system being characterized in that said at least one vial adaptor being vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial.

3. A drug mixing system comprising:

at least one receptacle port adaptor adapted to be inserted into a port of a fluid receptacle;

at least one vial adaptor adapted for connection to a vial containing a drug; and

at least one syringe adaptor adapted to be attached to a syringe and to at least one of said at least one receptacle port adaptor and said at least one vial adaptor; and

said system being characterized in that said at least one syringe adaptor is adapted to be brought into fluid communication and mechanically locked to at least one of said at least one receptacle port adaptor and said at least one vial adaptor in a single step.

4. A drug mixing system comprising:

at least one receptacle port adaptor adapted to be inserted into a port of a fluid receptacle; and

at least one vial adaptor adapted for connection to a vial containing a drug and connected to said at least one receptacle port adaptor,

said system being characterized in that at least one of said at least one receptacle port adaptor and said at least one vial adaptor is vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial.

5. A drug mixing system comprising:

at least one receptacle port adaptor adapted to be inserted into a port of a fluid receptacle; and

at least one vial adaptor adapted for connection to a vial containing a drug and connected to said at least one receptacle port adaptor,

said at least one vial adaptor including a venting and sealing element, operative to allow air into said drug mixing system and adapted to prevent air from escaping from said drug mixing system.

6. A drug mixing system according to claim 1 and also comprising a membrane vent operative to vent at least one of said at least one receptacle port adaptor, said at least one syringe adaptor and said at least one vial adaptor to the atmosphere.

7. A vial adaptor according to claim 6 and wherein said membrane vent includes a filter.

8. A drug mixing system according to claim 2 and also comprising a membrane vent operative to vent at least one of said at least one receptacle port adaptor, said at least one syringe adaptor and said at least one vial adaptor to the atmosphere.

9. A vial adaptor according to any of claims 6 – 8 and wherein said membrane vent comprises a hydrophobic membrane.

10. A drug mixing system according to claim 3 and wherein at least one of said at least one vial adaptor, said at least one receptacle port adaptor and said at least one syringe adaptor being vented to the atmosphere without permitting potentially harmful contents of said vial to reach the atmosphere.

11. A drug mixing system according to claim 4, and also comprising a stopcock connected to said at least one vial adaptor and to said at least one receptacle port adaptor.

12. A drug mixing system according to claim 5, and wherein said venting and sealing element comprises a hydrophobic membrane and a narrow bore.

13. A drug mixing system according to claim 12, wherein said narrow bore is irreversibly filled with liquid upon flow of liquid from said fluid receptacle to said vial, thus preventing air from escaping.

14. A drug mixing system according to any of claims 4-5 and 11-13 and wherein said receptacle port adaptor includes an elastomer covered needle and said receptacle port adaptor and said vial adaptor are integrally formed.

15. A drug mixing system according to any of claims 1-3 and 10 and wherein said receptacle port adaptor includes an elastomer covered needle and said receptacle port adaptor, said syringe adaptor and said vial adaptor are integrally formed.

16. A drug mixing system according to any of the preceding claims and wherein said at least one vial adaptor also comprises a protective vial housing operative to prevent release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form in the event of breakage of said vial.

17. A drug mixing system according to any of the preceding claims and wherein said fluid receptacle includes a spike port and said at least one receptacle port adaptor includes a spike port adaptor.

18. A drug mixing system according to any of the preceding claims and wherein said fluid receptacle includes a needle port and said at least one receptacle port adaptor includes a needle port adaptor.

19. A drug mixing system according to claim 18 and wherein said needle port adaptor includes a needle, said needle being protected by a needle protector.

20. A drug mixing system according to claim 19 and wherein said needle protector comprises a latex needle cover.

21. A drug mixing system according to any of the preceding claims and also comprising a vial head adaptor adapted for connection between said vial adaptor and said vial.

22. A drug mixing system according to any of the preceding claims and wherein said at least one receptacle port adaptor and said fluid receptacle are adapted to be connected to an intravenous cannula on a patient via an intravenous infusion set.

23. A drug mixing system according to any of the preceding claims 1-3, 6-10 and 15-22 and wherein said at least one syringe adaptor and said syringe are adapted to be connected to an intravenous cannula on a patient via an intravenous infusion set using an infusion set adaptor.

24. A drug mixing system according to any of the preceding claims 1-3, 6-10 and 15-23 and wherein said syringe adaptor is covered by a syringe cover element.

25. A drug mixing system comprising:

at least one drug mixing element including atmospheric venting functionality, characterized in that said atmospheric venting functionality prevents potentially harmful drug material from being released to the atmosphere via said venting functionality, said potentially harmful drug material including at least one of solid, liquid, gas and aerosol.

26. A drug mixing method comprising:

attaching a luer fitted hypodermic syringe having a plunger to a syringe adaptor;

inserting a receptacle port adaptor into a port in a receptacle containing a fluid;

attaching said syringe adaptor, having said syringe attached thereto, to said receptacle port adaptor;

retracting said plunger, thereby at least partially filling said syringe with fluid drawn from said receptacle in a manner which ensures that the fluid remains sterile and that a user is not exposed to the fluid;

connecting said syringe adaptor having said syringe attached thereto, to a vial adaptor assembly, having a drug containing vial attached thereto;

pushing said plunger, thus injecting said fluid contained in said syringe into said drug containing vial, thereby producing a drug solution in said vial; and

retracting said plunger, thus drawing at least part of the contents of said vial into said syringe,

wherein at least one of said receptacle port adaptor, said syringe adaptor and said vial adaptor is vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form.

27. A drug mixing method comprising:

attaching a luer fitted hypodermic syringe having a plunger to a syringe adaptor;

inserting a receptacle port adaptor into a port in a receptacle containing a fluid;

attaching said syringe adaptor, having said syringe attached thereto, to said receptacle port adaptor;

retracting said plunger, thereby at least partially filling said syringe with fluid drawn from said receptacle in a manner which ensures that the fluid remains sterile and that a user is not exposed to the fluid;

connecting said syringe adaptor having said syringe attached thereto, to a vial adaptor assembly, having a drug containing vial attached thereto;

pushing said plunger, thus injecting said fluid contained in said syringe into said drug containing vial, thereby producing a drug solution in said vial; and

retracting said plunger, thus drawing at least part of the contents of said vial into said syringe,

wherein said syringe adaptor is adapted to be brought into fluid communication and mechanically locked to at least one of said receptacle port adaptor and said vial adaptor in a single step.

28. A drug mixing method comprising:

attaching a luer fitted hypodermic syringe having a plunger to a syringe adaptor;

inserting a receptacle port adaptor into a port in a receptacle containing a fluid;

connecting said syringe adaptor having said syringe attached thereto, to a vial adaptor assembly, having a drug containing vial attached thereto;

retracting said plunger, thus drawing at least part of the contents of said vial into said syringe;

connecting said syringe adaptor having said syringe attached thereto, to said receptacle port adaptor; and

pushing said plunger, thus injecting said at least part of the contents of said vial into said receptacle,

wherein at least one of said receptacle port adaptor, said syringe adaptor and said vial adaptor is vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form.

29. A drug mixing method comprising:

attaching a luer fitted hypodermic syringe having a plunger to a syringe adaptor;

inserting a receptacle port adaptor into a port in a receptacle containing a fluid;

connecting said syringe adaptor having said syringe attached thereto, to a vial adaptor assembly, having a drug containing vial attached thereto;

retracting said plunger, thus drawing at least part of the contents of said vial into said syringe;

connecting said syringe adaptor having said syringe attached thereto, to said receptacle port adaptor; and

pushing said plunger, thus injecting said at least part of the contents of said vial into said receptacle,

wherein said syringe adaptor is adapted to be brought into fluid communication and mechanically locked to at least one of said receptacle port adaptor and said vial adaptor in a single step.

30. A drug mixing method comprising:

attaching a luer fitted hypodermic syringe having a plunger to a syringe adaptor;

connecting said syringe adaptor having said syringe attached thereto, to a vial adaptor assembly, having a drug containing vial attached thereto;

retracting said plunger, thus drawing at least part of the contents of said vial into said syringe; and

pushing said plunger, thus injecting said at least part of the contents of said vial into an infusion line,

wherein at least one of said receptacle port adaptor, said syringe adaptor and said vial adaptor is vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form.

31. A drug mixing method comprising:

attaching a luer fitted hypodermic syringe having a plunger to a syringe adaptor;

connecting said syringe adaptor having said syringe attached thereto, to a vial adaptor assembly, having a drug containing vial attached thereto;

retracting said plunger, thus drawing at least part of the contents of said vial into said syringe; and

pushing said plunger, thus injecting said at least part of the contents of said vial into an infusion line,

wherein said syringe adaptor is adapted to be brought into fluid communication and mechanically locked to at least one of said receptacle port adaptor and said vial adaptor in a single step.

32. A drug mixing method according to claim 26 or claim 27 and wherein said connecting said syringe adaptor also comprises disconnecting said syringe adaptor from said receptacle adaptor prior to said connecting.

33. A drug mixing method according to claim 28 or claim 29 and wherein said connecting said syringe adaptor having said syringe attached thereto to said receptacle port adaptor also comprises disconnecting said syringe adaptor from said vial adaptor prior to said connecting.

34. A drug mixing method according to any of claims 26-33 and wherein said connecting said syringe adaptor comprises:

connecting said drug containing vial to a vial head adaptor; and

connecting said drug containing vial having said vial head adaptor attached thereto to said vial adaptor assembly, prior to said connecting said syringe to said vial adaptor assembly.

35. A drug mixing method according to either of claims 26 and 27 and also comprising:

attaching said syringe adaptor, having said syringe containing at least part of said drug solution attached thereto, to said receptacle port adaptor; and

injecting contents of said syringe into said receptacle.

36. A drug mixing method comprising:

inserting a receptacle port adaptor into a port in a receptacle containing a fluid, said receptacle port adaptor being connected to a vial adaptor assembly;

connecting a drug containing vial to said vial adaptor assembly;

transferring at least a portion of said fluid from said receptacle to said drug containing vial, thereby producing a drug solution in said vial; and

subsequently transferring said drug solution from said vial to said receptacle,

wherein at least one of said receptacle port adaptor and said vial adaptor being vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form.

37. A drug mixing method according to claim 36 and wherein said connecting said drug containing vial comprises connecting said drug containing vial to a vial head adaptor prior to said connecting said drug containing vial.

38. A drug mixing method according to any of the preceding claims 26-29 and 32-37 and wherein said receptacle port adaptor comprises at least one of a spike port adaptor and a needle port adaptor.

39. A vial adaptor adapted for connection to a vial containing a drug and adapted for connection to other elements of a drug mixing system, said vial adaptor comprising:

a spike adapted for penetrating said vial;

a mechanical lock for locking said vial adaptor to said vial once said spike penetrates said vial; and

an element operative to vent the interior of said vial to said atmosphere without permitting potentially harmful contents of said vial to reach the atmosphere.

40. A vial adaptor according to claim 39 and also comprising a membrane vent operative to vent said vial adaptor to the atmosphere.

41. A vial adaptor according to claim 40 and wherein said membrane vent includes a filter.

42. A vial adaptor according to claim 40 or claim 36 41 and wherein said membrane vent comprises a hydrophobic membrane.

43. A vial adaptor according to any of claims 40-42 and also comprising a septum equipped syringe port.

44. A vial adaptor according to any of the preceding claims 40 – 43 and wherein said vial adaptor comprises at least one locking element, operative to irreversibly lock said vial adaptor to said vial.

45. A vial adaptor according claim 44 and wherein said at least one locking element includes at least one radially extending portion and at least one transversely extending portion.

46. A vial adaptor adapted for connection to a vial containing a drug and being adapted for connection to other elements of a drug mixing system, said vial adaptor comprising at least one locking element, operative to irreversibly lock said vial adaptor to said vial.

47. A vial adaptor according claim 46 and wherein said at least one locking element includes at least one radially extending portion and at least one transversely extending portion.

48. A vial adaptor adapted for connection to a vial containing a drug and being adapted for connection to a fluid transfer device, said vial adaptor being vented to the atmosphere in a manner which prevents release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form.

49. A vial adaptor according to claim 48 and also comprising a membrane vent operative to vent said vial adaptor to the atmosphere.

50. A vial adaptor according to claim 49 and wherein said membrane vent includes a filter.

51. A vial adaptor according to claim 49 or claim 50 and wherein said membrane vent comprises a hydrophobic membrane.

52. A syringe adaptor adapted for connection to a syringe and adapted for connection to at least one other element of a drug mixing system, said syringe adaptor comprising:

a septa housing;

at least two septa enclosed in said septa housing defining a space therebetween; and

a needle, including a tip located in said space when said syringe adaptor is not connected to said at least one other element.

53. A syringe adaptor according to claim 52 and wherein said septa housing is movable relative to said needle, thereby to expose said tip.

54. A syringe adaptor according to claim 52 or claim 53 and wherein at least a portion of said needle is protected by a needle protector.

55. A syringe adaptor according to claim 54 and wherein said needle protector comprises an elastomeric tubing element.

56. A vial head adaptor for use in connecting a vial with a first head circumference to a vial adaptor adapted for use with a vial with a second head circumference, said second head circumference being greater than said first head circumference, said vial head adaptor comprising at least one locking element.

57. A vial head adaptor according to claim 56 and wherein said at least one locking element includes four locking elements arranged generally at right angles to each other.

58. A vial head adaptor according to claim 57 wherein said at least one locking element includes a locking tooth.

59. A receptacle port adaptor for use in a drug mixing system comprising:

a housing;

a needle located within said housing and adapted to be inserted into a port of a fluid receptacle;

a septum located in said housing; and

a locking mechanism to fix said receptacle port adaptor to said port.

60. A receptacle port adaptor according to claim 59 and wherein said needle is protected by a needle protector.

61. A receptacle port adaptor according to claim 60 and wherein said needle protector comprises a latex needle cover.

62. A receptacle port adaptor according to any of claims 59 – 61 and wherein said needle moves between a protected position and a piercing position.

63. A protective vial housing for use with a drug mixing system comprising a fluid flow passageway adapted to connect a vial containing a drug to said drug mixing system, said protective vial housing being operative to prevent release to the atmosphere of possibly harmful contents of said vial in a liquid, solid or gaseous form in the event of breakage of said vial.